AMENDMENTS TO THE SPECIFICATION

In the specification of the Application, please amend paragraph 0001 as hereinafter indicated.

> [0001] The present invention relates to a method and system for generating random numbers with a specified probability density function that is faster and more efficient than current methods and ~~system~~ systems.

Please also amend paragraph 0002 in the specification as hereinafter indicated.

> [0002] Methods for generating random numbers with a specified probability density function (PDF) are well known. One such method is the Monte Carlo ~~Method~~ method. The Monte Carlo method provides approximate solutions to a variety of mathematical problems by performing statistical sampling experiments on a computer. The method applies to problems with no probabilistic content as well as to those with inherent probabilistic structure.

Please also amend paragraph 0007 in the specification as hereinafter indicated.

> [0007] It is a further object of the present invention to provide a random number generation method that reduces the number of samples needed to obtain a given overall accuracy for low-occurrence events.

Please also amend paragraph 0009 in the specification as hereinafter indicated.

> [0009] In accordance with the above and other objects of the present invention, a random number generation method having a cumulative density function (CDF) is provided. (The CDF is the integral of the PDF). According to the method, a set of discrete numbers between an upper limit and a lower limit is generated. The set of discrete numbers are uniformly spaced between the upper limit and the lower limit. Each individual number from the set of random numbers is mapped to a corresponding value on a cumulative density function curve to provide a number of samples. The samples are then scrambled to randomize the order of the samples.

Please also amend paragraph 0019 in the specification as hereinafter indicated.

[0019] Referring [[now]] generally to [[the]] Figures 1-5 and now specifically to Figure 3, the preferred system and method 10 [[is]] preferably ~~comprised of~~ comprises three components. The first component is an initial sample generation component 12, which generates numbers with immediate uniform distribution. In accordance with the number generation component 12, a set of numbers {R} is generated. The set of random numbers is preferably generated such that they have a uniform distribution between 0 and 1. Equivalently, instead of a uniform distribution between 0 and 1, random percentages may be generated to have a uniform distribution between 0% and 100%.

Please also amend paragraph 0023 in the specification as hereinafter indicated.

[0023] The preferred method provides a more efficient way to look up the X value for each input element in {R}. Initially, all values of {R} are arranged in, say, a descending order. Since both {Y} and {R} are in descending order, it would not be necessary to begin at Y_1 each time to find the nearest value in {Y}. Since the next value of R, R_{k+1}, is smaller than R_k, Y_{k+1} is smaller or equal to Y_K. In fact, Y_{K+1} is very close to Y_K, and the search becomes very fast. Since significantly fewer comparisons with candidate numbers are required, significant overall savings in processing time can be achieved through utilization of the disclosed method and system. After the lookup has been completed, the order of {X} values are scrambled, as generally indicated by reference number 16. Order randomization may be achieved in one of several ways. For example, it may be done by generating a pseudo-random number (PRN) sequence {P}, which is then truncated to the length of {X} if necessary. {X} is then reordered by the elements of {P} as the latter are generated one at a time.

Please also amend paragraph 0026 in the specification as hereinafter indicated.

[0026] For example, a given PDF might have 90% of its events happening between A and B in Figure 2, but only 10% between B and C. Suppose the impact region of interest is from the scarce region between B and C. For each sample X generated between B and C as desired, 9 samples between A and B would normally be generated as well. This is where the method of companding comes in. With companding, 10 times as many random points {R} would be generated between 0 and 0.1 of Y, as would normally be generated. This is accompanied with a corresponding reduction in the number of samples generated between the popular region between 0.1 and 1.0 of Y for a given ~~member~~ number of total samples. After all the points are generated and statistically

processed, the over-represented section is re-adjusted by dividing the probability of that section by the companding factor N. Therefore, the low-probability samples are compressed while the high-probability samples are expanded. In effect, by reducing the spacing for ~~low probability~~ low-probability samples, more samples are present in the low-probability area. By increasing the spacing for the ~~high probability~~ high-probability area, fewer samples are present in the high-probability area.

Please also amend paragraph 0028 in the specification as hereinafter indicated.

[0028] The combination of these three components ~~provide~~ provides a very efficient and accurate method and system for generating a set of random ~~number~~ numbers with a given PDF.

Please also renumber original paragraph 0032 in the specification as new paragraph 0035, as is indicated hereinbelow.

~~[0032]~~ [0035] Having now fully described the invention, it will be apparent to one of ordinary skill in the art that many changes and modifications can be made thereto without departing from the spirit or scope of the invention as set forth herein.

Please also amend and renumber original paragraph 0033 (i.e., the ABSTRACT) in the specification as new paragraph 0036, as is indicated hereinbelow.

~~[0033]~~ [0036] A method for generating a set of random numbers with statistics represented by a cumulative density function (CDF) includes generating a set of uniformly spaced samples between an upper limit and a lower limit. Each of the uniformly spaced samples are then mapped to a corresponding value on a cumulative density function curve. The set of uniformly spaced samples are then scrambled to randomize the samples. Companding may also be incorporated in the sample generation process.

In the specification, please insert new paragraph 0032, which is generally a recitation of originally filed claim 1, as set forth hereinbelow.

[0032] In general, the present invention provides a method for generating a set of random numbers with statistics represented by a cumulative density function. In one methodology of the invention, the method includes the steps of generating a set of

uniformly spaced samples between an upper limit and a lower limit, mapping each one of the set of uniformly spaced samples to a corresponding value on a cumulative density function curve, and scrambling the set of uniformly spaced samples.

Please also insert new paragraph 0033, which is generally a recitation of originally filed claim 11, as set forth hereinbelow.

[0033] In addition, the present invention also provides a method of random number generation with a desired cumulative density function. In one methodology of the invention, the method includes the steps of generating a set of discrete samples between an upper limit and a lower limit, uniformly stepping the set of discrete samples in descending order between the upper limit and the lower limit, and mapping the set of random numbers to a set of values stored in ascending order and having a specified probability density function.

Lastly, please also insert new paragraph 0034, which is generally a recitation of originally filed claim 17, as set forth hereinbelow.

[0034] Furthermore, the present invention also provides a random number generation system. In one embodiment of the invention, the system includes (i) a first component for generating uniformly spaced numbers, independent of a total number of samples; (ii) a second component for mapping the generated random numbers into a desired distribution through table lookup and scrambling; and (iii) a third component for reducing the total number of samples needed to achieve a given statistical accuracy.